

PROSO MILLET (*Panicum miliaceum* L.) AND ITS NUTRITIONAL BENEFITS

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Abstract

Proso millet is a coarse grain that grows on marginal soils in dry and semiarid regions. The practice of consuming proso millet as part of the daily diet is not new to India. "Until the Green Revolution, proso millet had been the main staple grain in central India, southern India, and the mountainous parts of Uttarakhand for millennia. Millets were eliminated from our diet in the 1970s with the introduction of high-yielding wheat and rice types. This led to a significant increase in the consumption of polished rice and refined wheat flour, which also happen to be the primary components of foods consumed by urban residents. The lack of knowledge about the dietary advantages, the unappealing taste, and the label as "poor man's food" are the causes of this. Because of proso millet's nutritional importance, it is necessary to investigate the nutritional traits and practical qualities of various millet cultivars as well as create value-added millet products.

Keywords: Proso millet, Arid regions, Green revolution, High yielding varieties, Nutritional benefits.

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Introduction

Millets are a collective word for a variety of small-grained cereal grasses and oldest among the developed addition crop (Kumar 2016; Rawat *et al.*, 2019). On marginal soils with low fertility, millets are typically among the best crops for sustaining agriculture and food security. Millet crops are grown in low-input agricultural conditions in which major cereal crops often produce low yields (Amadou *et al.*, 2013). Especially in areas like Asia, Sub-Saharan, and West Africa where average rainfall is frequently less than 500 mm and soils are sandy and slightly acidic, millet can be prolific even under difficult growing circumstances (Changmei and Dorothy, 2014). The agricultural research and development community is gradually rediscovering and studying the underutilized millets known as "nutri cereal" crops (Grovermann *et al.*, 2018). Better nutritious fibre and resistant starch are found in millet grains. These nutritious components that digest more slowly give you a feeling of fullness for a longer time and aid in preventing constipation by hastening the passage of meals through your digestive system.

Additionally, they remove toxins from the gut by binding to them, guarding the colon mucosa against cancer. Millets have reportedly been successfully cultivated for centuries, which could demonstrate to both their adaptability to a variety of environments and certain inherent qualities that merited the valuation for endless ages (Rawat *et al.*, 2020). Millets are a major source of food for the vast majority of people living in the arid and semi-dry tropical regions on the continents of Asia and Africa (Doggett 1989; Maloles *et al.*, 2011). Millets are commonly subdivided into two most important groups of species, major millets and minor millets (Rawat *et al.*, 2021). In India, finger millet accounts for around 80% of production and is followed by kodo millet, foxtail millet, barnyard millet, and proso millet. The total area under small millet cultivation is primarily 7.0 lakh ha with a productivity of 633 kg/ha (Anbukani *et al.*, 2017; Kukreti *et al.*, 2021). All of these crops offer exceptional nutritional qualities, such as high levels of micronutrients, dietary fibre, and low glycemic index (GI), which may have potential health benefits (Dwivedi *et al.*, 2012). Proso, barnyard, kodo, and little millets, together with finger and foxtail millets, are utilised as an ingredient in multigrain and gluten-free cereal goods. They are also a key element in a number of traditional dishes and beverages, including bread, porridge, and snack foods (Upadhyaya *et al.*, 2016). In comparison to other millets like finger millet, barnyard millet, and foxtail millet, proso millet crop is understudied, underutilised, and neglected in terms of support for production, promotion, research, and development. To create high-yielding variants, diversify diets for healthy lifestyles, and combat the worldwide concerns of malnutrition and climate change, further study on proso millet is needed. Proso millet is the main subject of this chapter, which also gives a general review of its origin, development, domestication, and diversity. In this chapter, we mainly focus on proso millet and provide an overview of its origin, history, domestication, and diversity.

Proso Millet (*Panicum miliaceum*)

Origin and Distribution

According to archaeological studies, domestication of proso millet occurred during the start of the Holocene, when temperatures were higher and hunter-gatherers were

exposed to novel plants and habitats. Although weedy millet varieties are widespread in Eurasia and may have a wild offspring, the ancestor of proso millet has not yet been discovered (Miller *et al.*, 2016). Proso millet is an annual herbaceous plant belonging to the *Panicum* genus, with chromosomal number $2n = 36$.

Chromosomal *in situ* hybridization using genomic DNA and phylogenetic evidence suggest the allotetraploid form of proso millet, with or comparable to *Panicum capillare* and *Panicum repens* as ancestors.

Botanical Description

Proso millet or common millet (*Panicum miliaceum*), is a short-term or fast growing crop with low moisture/water requirements. It may thrive in a variety of soil types and climatic conditions. In comparison to other millets, proso millet has a shorter growing season and can finish its life cycle 60 to 100 days after sowing. It is a summer annual herb that is most commonly grown as a late-seeded crop. Seeds are round, approximately 3 mm long, and 2 mm wide, the grains are enclosed in a smooth, typically white or creamy-white, yellow, or red shell. It grows upto 30 to 100 cm tall plant with few tillers and an adventive root structure. Historically, this millet was grown in Northern India, Russia, China, and other places. In India, It was later mostly replaced by rice, wheat and other cereals (Rawat *et al.*, 2021).

Nutritional Values

Millets comparable to major grains like wheat, rice, and maize having high nutritional value, energy and protein content (Amadou *et al.*, 2013; Saleh *et al.*, 2013). Millets stand out from other cereals because to their high levels of protein, dietary fibre, polyphenols, calcium, iron, potassium, magnesium, phosphorus, and zinc. Proso millet is gluten-free and has significant amounts of carbohydrates and fatty acids. Proso millet contains almost all the nutrients in higher amount like protein (12.5g/100g), carbohydrate (70.4g/100g), fat (3.1g/100g), dietary fibre (14.2g/100g), mineral matter (1.9g/100g), calcium (14g/100g), phosphorous (206m/100g) and iron (10g/100g) which are the core ingredients of normal human diet (Habiya *et al.*, 2017).

Edible Uses

Proso millet can be cooked in various ways and prepared similar to rice, the grains can be boiled, steamed to make salad, or cooked completely. It can be used in salads, stir fried with vegetables and tofu, or can be eaten in breakfast with milk and honey. Proso millet can be a substratum in distilled liquors and beers, and is used in Africa and Asia to make fermented beverages (Habiya *et al.*, 2017).

Medicinal Uses

Proso millet is rich in magnesium which helps to lower the blood pressure and also decreases the chances of strokes, heart attacks and atherosclerosis. It is a good source of potassium which helps to maintain low blood pressure as it acts as a vasodilator. Consuming proso millet and other millets is linked to a lower risk of type 2 diabetes mellitus because whole grains are a rich source of magnesium. Since the incidence of migraine headaches and heart attacks can also be decreased by magnesium, people with atherosclerosis and heart disease benefit from it (Shobana and Malleshi, 2007; Gelin *et al.*, 2008).

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